

Smart Citites R6 Installation Guide

- [Introduction](#)
- [License](#)
- [How to use this document](#)
- [Deployment Architecture](#)
- [Pre-Installation Requirements](#)
 - [Deploy Device Requirements](#)
 - [Complie Device Requirements](#)
- [Build PARSEC](#)
- [Build Demo App](#)
 - [Build ParsecClient](#)
 - [Build NodeAuthServer](#)
 - [Build NodeAuthAgent](#)
 - [Build CameraClient](#)
 - [Build TritonClient](#)
- [Deploy Demo App on SONiC](#)
 - [Connect to SONiC](#)
 - [Deploy Parsec server](#)
 - [add system user parsec \(NEED login by root\)](#)
 - [create necessary directorys \(NEED login by root\)](#)
 - [deploy files \(NEED login by parsec\)](#)
 - [add service for systemctl \(NEED login by root\)](#)
 - [start parsec servive \(NEED login by root\)](#)
 - [Deploy Parsec Client](#)
 - [Deploy NodeAuthServer](#)
 - [Deploy k3s Server](#)
 - [Deploy EdgeFaas](#)
- [Deploy Demo App on Nvidia Nano](#)
 - [Deploy Parsec Server](#)
 - [prepared files directory structure](#)
 - [add system user parsec \(NEED login by root\)](#)
 - [create necessary directorys \(NEED login by root\)](#)
 - [deploy files \(NEED login by parsec\)](#)
 - [start parsec servive \(NEED login by parsec\)](#)
 - [Deploy Parsec client](#)
 - [Deploy NodeAuthAgent](#)
 - [Deploy k3s agent](#)
 - [Deploy Triton Server](#)
 - [Deploy Triton client](#)
- [Maintenance](#)
- [Frequently Asked Questions](#)
- [License](#)
- [References](#)
- [Definitions, acronyms and abbreviations](#)

• Introduction

Smart Cities is an edge resource scheduling solution.

This guide setup a cluster network, one switch run with k3s server , one Nvidia Nona run with k3s node.

EdgeFaaS provide API to access the cluster network's capability.

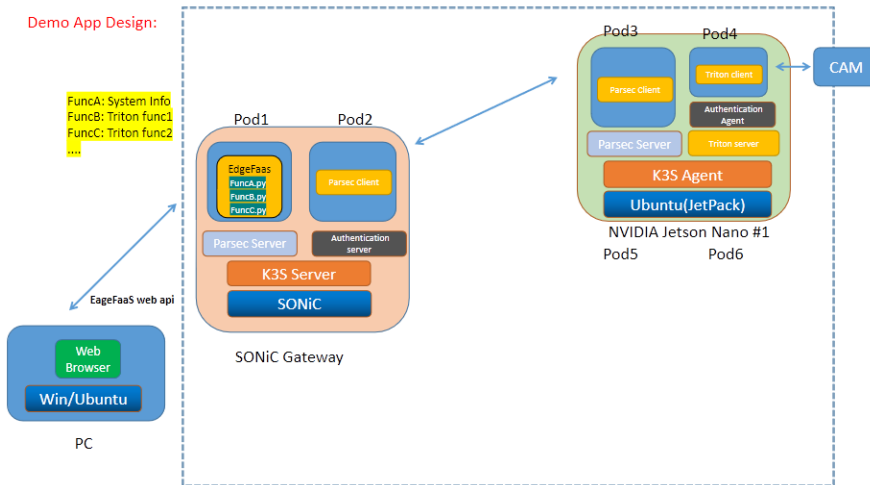
• License

Apache License v2.0

• How to use this document

The document describes how to compile demo app from source code, and deploy to device.

• Deployment Architecture



• Pre-Installation Requirements

◦ Deploy Device Requirements

- Network Switch run with SONiC
 - CPU core: 4
 - RAM: 4G
 - HDD: 16G
- Nvidia Nano run with Jetson
 - CPU core: 4
 - RAM: 2G
 - HDD: 32G

◦ Compie Device Requirements

- Arm64 device run with Ubunut 18.04+
- CPU core: 4
- RAM: 4G
- HDD: 32G
- Rust 1.54.0 +
- Docker 20.10.1+
- Golang 1.16+

• Build PARSEC

```
$ git clone git clone "https://gerrit.akraino.org/r/a/cassini"
```

```
$ cd cassini/smartcities/parsec
```

```
$ cargo build --release --features "mbed-crypto-provider,direct-authenticator"
```

The compiled binary executable is in ./target/release/parsec.

Template of config file is in ./config.toml, it will be modify when deloy.

Template of parsec.service file is in ./systemd-daemon/parsec.service it will be modify when deloy.

• Build Demo App

◦ Build ParsecClient

```
$ cd cassini/smartcities/ParsecClient/
```

```
$ ./build.sh
```

```
$ sudo docker images
```

```
REPOSITORY TAG IMAGE ID CREATED SIZE
```

```
parsec-client v1.0 aef2a010b6b5 3 months ago 17.3MB
```

```
$ sudo docker save aef2a010b6b5 > parsec-client-v1.0-docker-aarch64.tar
```

The saved parsec-client-v1.0-docker-aarch64.tar will use to delpoy on SONiC and Nvidia Nona.

- **Build NodeAuthServer**

```
$ cd cassini/smartcities/NodeAuthServer/
```

```
$ go build
```

- **Build NodeAuthAgent**

```
$ cd cassini/smartcities/NodeAuthAgent/
```

```
$ go build
```

- **Build CameraClient**

```
$ cd cassini/smartcities/CameraClient/
```

```
$ go build
```

- **Build TritonClient**

```
$ cd cassini/smartcities/TritonClient/
```

```
$ ./build.sh
```

```
$ sudo docker images
```

```
REPOSITORY TAG IMAGE ID CREATED SIZE
```

```
triton-client v1.0 deaf4b1027ed 3 weeks ago 1.32 GB
```

```
$ sudo docker save deaf4b1027ed > triton-client-v1.0-docker-aarch64.tar
```

The saved triton-client-v1.0-docker-aarch64.tar will use to delpoy on Nvidia Nona.

- **Deploy Demo App on SONiC**

- **Connect to SONiC**

Use serial console connect to SONiC device, serial param is below:

Baud rate: 115200

Data bit: 8

Parity: None

Stop bits: 1

Contorol: None

- **Deploy Parsec server**

- 1. **add system user parsec (NEED login by root)**

```
$ sudo useradd -m parsec
```

```
$ sudo passwd parsec
```

```
$ sudo usermod -s /bin/bash parsec
```

```
$ sudo groupadd parsec-clients
```

- 2. **create necessary directorys (NEED login by root)**

```
$ sudo mkdir /var/lib/parsec
```

```
$ sudo chown parsec:parsec /var/lib/parsec
```

```
$ sudo chmod 700 /var/lib/parsec
```

```
$ sudo mkdir /etc/parsec
```

```
$ sudo chown parsec:parsec /etc/parsec
```

```
$ sudo chmod 700 /etc/parsec
```

```
$ sudo mkdir /usr/libexec/parsec
```

```
$ sudo chown parsec:parsec /usr/libexec/parsec
```

```
$ sudo chmod 700 /usr/libexec/parsec
```

```
$ sudo mkdir /home/parsec/run/
```

```
$ sudo chown parsec:parsec-clients /home/parsec/run/
```

```
$ sudo chmod 750 /home/parsec/run/
```

3. deploy files (NEED login by parsec)

```
$ cd ~
```

```
$ pwd
```

```
/home/parsec
```

```
$ cp xxx/parsec/target/release/parsec /usr/libexec/parsec
```

```
$ chmod +x /usr/libexec/parsec/parsec
```

```
$ cp xxx/parsec/config.toml /etc/parsec/config.toml
```

Note: need unmark **allow_root = true** in config.toml.

4. add service for systemctl (NEED login by root)

```
$ sudo vim /etc/systemd/system/parsec.service
```

```
[Unit]
```

```
Description=Parsec Service
```

```
Documentation=https://parallaxsecond.github.io/parsec-book/parsec_service/install_parsec_linux.html
```

```
[Service]
```

```
WorkingDirectory=/home/parsec/
```

```
ExecStart=/usr/libexec/parsec/parsec --config /etc/parsec/config.toml
```

```
[Install]
```

```
WantedBy=multi-user.target
```

5. start parsec servive (NEED login by root)

```
$ sudo systemctl enable parsec.service
```

```
$ sudo systemctl start parsec.service
```

◦ Deploy Parsec Client

1. import docker image.

```
$ sudo docker load < parsec-client-v1.0-docker-aarch64.tar
```

```
$ sudo docker images
```

```
$ sudo docker tag d396f7adeed3 parsec-client:v1.0
```

2. run image.

```
$ sudo docker run --restart=always -d -p8300:8300 -v /home/parsec/run:/run/parsec parsec-client:v1.0
```

```
$ curl -v -d '{"Name": "GoClient"}' 127.0.0.1:8300/client
```

3. create key pairs and export the public key.

```
$ curl -v -d '{"Name": "GoClient"}' 127.0.0.1:8300/client
```

```
$ curl -v -d '{"Name": "GoClient", "KeyName": "MyEncKey"}' 127.0.0.1:8300/keyenc
```

```
$ curl -v -X GET -d '{"Name": "GoClient", "KeyName": "MyEncKey"}' 127.0.0.1:8300/key
```

◦ Deploy NodeAuthServer

1. deploy files

```
$ sudo mkdir /usr/libexec/NodeAuth
```

```
$ sudo cp xxx/NodeAuthServer /usr/libexec/NodeAuth
```

```
$ sudo chmod +x /usr/libexec/NodeAuth/NodeAuthServer
```

2. add service for systemctl

```
$ sudo vim /etc/systemd/system/NodeAuthServer.service
```

```
[Unit]
```

```
Description=Node Auth Server
```

```
[Service]
```

```
WorkingDirectory=/usr/libexec/NodeAuth
```

```
ExecStart=/usr/libexec/NodeAuth/NodeAuthServer
```

```
[Install]
```

```
WantedBy=multi-user.target
```

3. start parsec servive

```
$ sudo systemctl enable NodeAuthServer.service
```

```
$ sudo systemctl start NodeAuthServer.service
```

- **Deploy k3s Server**

1. install and get token

```
$ curl -sL https://get.k3s.io | sh -s - --docker
```

```
$ sudo cat /var/lib/rancher/k3s/server/node-token
```

```
K10f3a81f8be38c4f230e45d330b153a6266a665d3310764d0d09075c2d4a40aa5b::server:  
a3abba7155f2f7b4684dbc548724ed22
```

- **Deploy EdgeFaas**

1. run by docker

```
$ sudo docker run --name edgefaas --restart=always -d -p8888:8080 registry.gitlab.com/arm-research/smarter/edgefaas  
/edgefaas:v1-1-0
```

2. install demo apis

```
$ curl 192.168.0.118:8888/mgmt -d "http://192.168.0.104:8080/sysinfo.py"
```

```
$ curl 192.168.0.118:8888/mgmt -d "http://192.168.0.104:8080/camera.py"
```

```
$ curl 192.168.0.118:8888/mgmt -d "http://192.168.0.104:8080/image.py"
```

Note: 192.168.0.118 is EdgeFaas device, 192.168.0.104 is PC.

- **Deploy Demo App on Nvidia Nano**

- **Deploy Parsec Server**

1. **prepared files directory structure**

```
parsec-server-aarch64/
```

```
parsec
```

```
config.toml
```

```
parsec.service
```

2. **add system user parsec (NEED login by root)**

```
$ sudo useradd -m parsec
```

```
$ sudo passwd parsec
```

```
$ sudo usermod -s /bin/bash parsec
```

```
$ sudo loginctl enable-linger parsec
```

```
$ sudo groupadd parsec-clients
```

3. **create necessary directorys (NEED login by root)**

```
$ sudo mkdir /var/lib/parsec
```

```
$ sudo chown parsec:parsec /var/lib/parsec
```

```
$ sudo chmod 700 /var/lib/parsec
```

```
$ sudo mkdir /etc/parsec
```

```
$ sudo chown parsec:parsec /etc/parsec
```

```
$ sudo chmod 700 /etc/parsec
```

```
$ sudo mkdir /usr/libexec/parsec
```

```
$ sudo chown parsec:parsec /usr/libexec/parsec
```

```
$ sudo chmod 700 /usr/libexec/parsec
```

```
$ sudo mkdir /home/parsec/run/
```

```
$ sudo chown parsec:parsec-clients /home/parsec/run/
```

```
$ sudo chmod 750 /home/parsec/run/
```

4. **deploy files (NEED login by parsec)**

```
$ cp xxx/parsec-server-aarch64/parsec /usr/libexec/parsec
```

```
$ chmod +x /usr/libexec/parsec/parsec
```

```
$ cp xxx/parsec-server-aarch64/config.toml /etc/parsec/config.toml
```

```
$ mkdir -p ~/.config/systemd/user
```

```
$ cp xxx/parsec-server-aarch64/parsec.service ~/.config/systemd/user
```

5. start parsec servive (NEED login by parsec)

```
$ systemctl --user enable parsec
```

```
$ systemctl --user start parsec
```

○ Deploy Parsec client

- import docker image

```
$ sudo docker load < parsec-client-v1.0-docker-aarch64.tar
```

```
$ sudo docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
<none>	<none>	d396f7adeed3	2 months ago	16.9MB

```
$ sudo docker tag d396f7adeed3 parsec-client:v1.0
```
- run image

```
$ sudo docker run --restart=always -d -p8300:8300 -v /home/parsec/run:/run/parsec parsec-client:v1.0
```

```
$ curl -v -d '{"Name": "GoClient"}' 127.0.0.1:8300/client
```

```
...
```

```
HTTP/1.1 200 OK
```

```
...
```
- import public key

```
$ curl -v -d '{"Name": "GoClient", "KeyName": "MyPubKey", "Message": "ssh-rsa"
MIIBCgKCAQEAui7zi+ehpbtqa+haTF2S7dB01QKf2zplpy
//58x9j4L1ZR44h7ftdymJlg3c07VBRVEx5BUluaXPZ2g4Yq5Un21LK9GQoPvislU53ePQN5anY4sO+NhqPOnaobkX02Pflp1m5
EYjyCgVY62of/DXaPyr91xFeeyvRjFgfyPA+xk7VCsbjtNEL118lhJLmMVqNq/OgDDTvCN93hgJD5D
/nRvXhe4CVR6ZYvBLF1E7blwccq3EcmtYO+u3l0mPQSm9OR6YLhqxTcw29G/MBP+1X6yokALE
/0Ykt0FxIOIQDkdukKtK50p38kzluQ9iHlOhG2QWhTpqwa7boQyexCxiLiLQIDAQAB GoClient_MyEncKey"}' 127.0.0.1:8300/key
```

○ Deploy NodeAuthAgent

- deploy files

```
$ sudo mkdir /usr/libexec/NodeAuth
```

```
$ sudo cp xxx/NodeAuthAgent /usr/libexec/NodeAuth
```

```
$ sudo chmod +x /usr/libexec/NodeAuth/NodeAuthAgent
```
- config systemctl service

```
$ sudo vim /etc/systemd/system/NodeAuthAgent.service
```

```
[Unit]
```

```
Description=Node Auth Agent
```



```
[Service]
```

```
WorkingDirectory=/usr/libexec/NodeAuth
```

```
ExecStart=/usr/libexec/NodeAuth/NodeAuthAgent
```



```
[Install]
```

```
WantedBy=multi-user.target
```
- start service

```
$ sudo systemctl enable NodeAuthAgent.service
```

```
$ sudo systemctl start NodeAuthAgent.service
```

○ Deploy k3s agent

- install with k3s server token

```
$ curl -sfl https://get.k3s.io | K3S_URL=https://192.168.0.116:6443
```

```
K3S_TOKEN=K10f3a81f8be38c4f230e45d330b153a6266a665d3310764d0d09075c2d4a40aa5b::server:
```

```
a3abba7155f2f7b4684dbc548724ed22 sh -s - --docker
```

○ Deploy Triton Server

- get JetPack

```
$ wget https://github.com/triton-inference-server/server/releases/download/v2.17.0/tritonserver2.17.0-jetpack4.6.tgz
```

```
$ tar zxvf tritonserver2.17.0-jetpack4.6.tgz
```
- Installation dependent environment

```
$ sudo apt-get update && \
```

```
sudo apt-get install -y --no-install-recommends \
```

```
software-properties-common \
```

```
autoconf \
```

```
automake \
```

```
build-essential \
```

```
cmake \
```

```
git \
```

```
libb64-dev \
```

```
libre2-dev \
```

```
libssl-dev \
```

```
libtool \
```

```
libboost-dev \
```

```
libcurl4-openssl-dev \
```

```
libopenblas-dev \
```

```
rapidjson-dev \
```

```
patchelf \
```

```
zlib1g-dev
```

```
$ sudo apt remove cmake
```

```
$ wget https://cmake.org/files/v3.21/cmake-3.21.0.tar.gz
```

- ```

$ tar -xf cmake-3.21.0.tar.gz
$ cd cmake-3.21.0 && ./configure && sudo make install
$ sudo apt-get install -y --no-install-recommends \
 curl \
 pkg-config \
 python3 \
 python3-pip \
 python3-dev
$ sudo pip3 install --upgrade wheel setuptools cython
$ sudo pip3 install --upgrade grpcio-tools numpy==1.19.4 future attrdict

```
- get Triton Model
 

```

$ git clone https://github.com/triton-inference-server/server
$ git checkout r21.12
$ cd docs/examples
$./fetch_models.sh

```
  - test Triton server
 

```

$ cd tritonserver2.17.0
$ bin/tritonserver --model-repository=../model_repository --backend-directory=./backends --backend-config=tensorflow,version=2
$ curl -v localhost:8000/v2/health/ready

```
  - create systemd service
 

```

$ sudo useradd -m triton
$ sudo passwd triton
$ sudo usermod -s /bin/bash triton
$ sudo loginctl enable-linger triton
$ cp -R /xxx/tritonserver2.17.0 ./
$ cp -R /home/u0u0/Documents/model_repository ./
$ mkdir -p ~/.config/systemd/user
$ vim ~/.config/systemd/user/triton.service
[Unit]
Description=Triton Server

[Service]
WorkingDirectory=/home/triton
ExecStart=/home/triton/tritonserver2.17.0/bin/tritonserver --model-repository=/home/triton/model_repository --backend-
directory=/home/triton/tritonserver2.17.0/backends --backend-config=tensorflow,version=2

[Install]
WantedBy=default.target

```
  - start service
 

```

$ systemctl --user enable triton
$ systemctl --user start triton

```
- **Deploy Triton client**
    - import docker image
 

```

$ sudo docker load < triton-client-v1.0-docker-aarch64.tar
$ sudo docker images
$ sudo docker tag a39dfgf7adeed3 triton-client:v1.0

```
    - run image
 

```

$ sudo docker run --restart=always --add-host=host.docker.internal:host-gateway -d -p8302:8302 triton-client:v1.0

```

## • Maintenance

Blue Print Package Maintenance

## • Frequently Asked Questions

N/A

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- References

N/A

- Definitions, acronyms and abbreviations

N/A